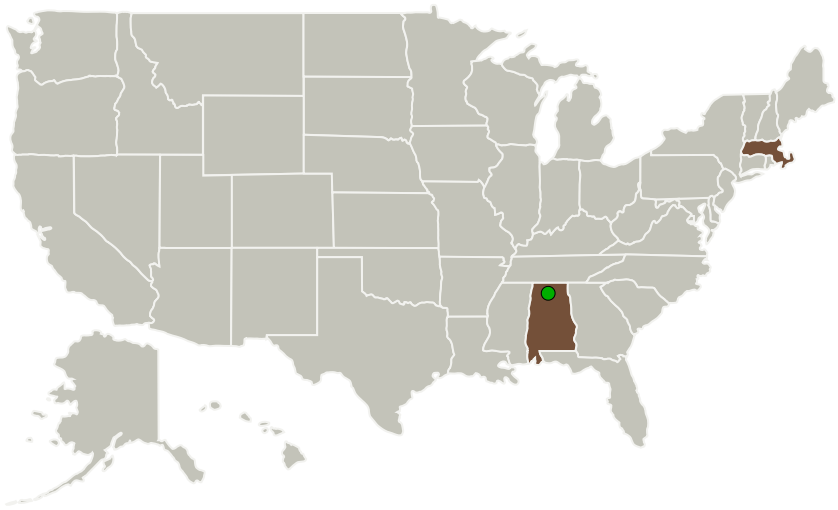
Radiation Tolerant Temperature-Invariant Scintillation Modules, Phase II

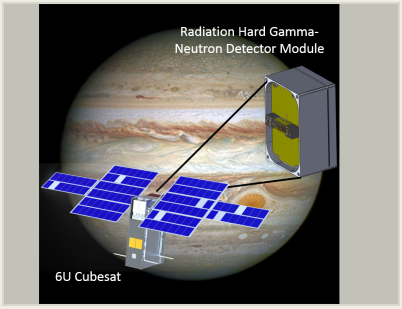
Completed Technology Project (2017 - 2019)

Project Introduction

Radiation detectors are an invaluable tool for space applications spanning planetary science, astrophysics, heliophysics, space weather, and dosimetry for human exploration. Scintillators are materials that generate a light flash with an intensity that is proportional to the ionizing energy deposited. However, scintillator efficiency gradually decays with increased exposure to radiation. For exploration missions to hostile environments, such as those around Jupiter, Venus or Mercury, large ionizing doses are expected for the scintillation material, rendering them useless. A common practice to mitigate dose effects is to anneal the scintillation materials. In addition, sensitivity, dictated by detector volume, is critical for science missions, such mapping H2O concentration over a planetary surface. This project will develop a scintillator module using advanced materials, such as Cs2LiYCl6(CLYC), LiSr2I5 (LSI), or Tl2LiYCl6 (TLYC), that provide both high-performance gamma ray and neutron spectroscopy within a single volume. Si photomultipliers (SiPM) will maximize the active volume relative to the total volume. The project will result in a large-volume, high-performance detector module, rigorously tested for flight, with protocols for annealing and science operation

Primary U.S. Work Locations and Key Partners





Radiation Tolerant Temperature-Invariant Scintillation Modules, Phase II Briefing Chart Image

Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

Radiation Tolerant Temperature-Invariant Scintillation Modules, Phase II

Completed Technology Project (2017 - 2019)

Organizations Performing Work	Role	Type	Location
Radiation Monitoring Devices, Inc.	Lead Organization	Industry	Watertown, Massachusetts
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Massachusetts

Project Transitions

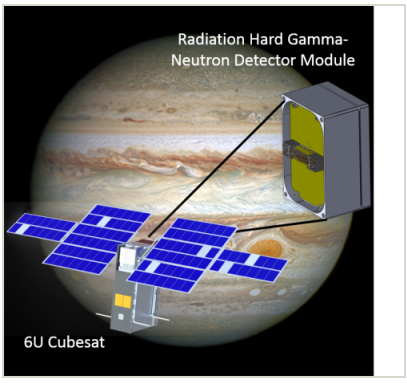
April 2017: Project Start

July 2019: Closed out

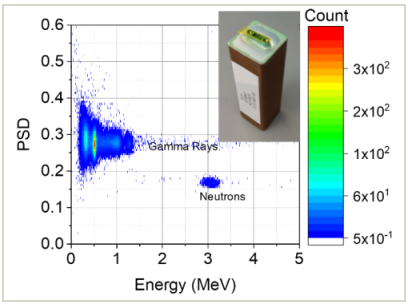
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140932)*

Images



Briefing Chart Image
Radiation Tolerant Temperature-Invariant Scintillation Modules, Phase II Briefing Chart Image *(https://techport.nasa.gov/image/137287)*



Final Summary Chart Image
Radiation Tolerant Temperature-Invariant Scintillation Modules, Phase II *(https://techport.nasa.gov/image/132551)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Radiation Monitoring Devices, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

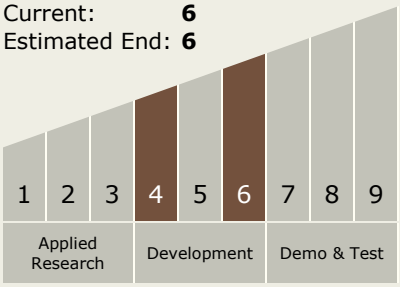
Carlos Torrez

Principal Investigator:

Erik B Johnson

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Radiation Tolerant Temperature-Invariant Scintillation Modules, Phase II

Completed Technology Project (2017 - 2019)

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System